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Floristic Provinces of Illinois

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INTRODUCTION

Certain areas of the landscape are associated with more rapid changes in species composition than others. These areas of rapid transition separate floristic units and are frequently associated with marked climatic changes across short distances. Edaphic conditions and vegetation are typically different on each side of the transitional area. These transitional zones were termed tension zones by Curtis (1959) and are ecotonal in nature. Curtis (1959) used Clements' (1905) definition of an ecotone to locate floristic provinces of Wisconsin. "The limiting line or ecotone of a . . . province is a composite obtained from the limits of species typical of the contiguous vegetation." Using precise range maps, Curtis (1959) found two floristic provinces, the northern-conifer hardwoods and the prairie-forest border that were separated by a transitional zone extending from northwestern Wisconsin to Milwaukee County in the southeast. This floristic transitional zone (tension zone) was characterized by having a high number of species reaching their range limit in the zone.

Several authors have delineated vegetational zones for Illinois based primarily on physiographic divisions (Vestal 1931; Braun 1950; Voigt and Mohlenbrock 1964; Schwegmen 1975). As defined by Curtis (1959), floristic provinces have not been previously described in Illinois. The purpose of this work was to delineate floristic provinces in Illinois using Curtis' (1959) methods.

In delineating floristic provinces in Wisconsin, Curtis (1959) used dot maps that showed the collection locality for each species. Using these maps, range limits were drawn for 182 species. The number of species terminating their range within each county was tabulated. However, the position of the transitional zone between floristic provinces was determined by the density of individual

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range lines. Therefore, a portion of a county might be excluded from the zone, if it had few range limit lines within it, even though the county as a whole had many species reaching their range limits.

Various workers have prepared Illinois plant distribution maps by placing a single dot in a county center, regardless of where in the county the collection occurred. In our study boundaries between floristic provinces were determined by the number of species that terminate their ranges in each county (Fig. 1). All species having a range termination within Illinois (with the exception of species used for ornamental purposes) were selected for inclusion in the study. A total of 317 species were used. Distribution of phanerograms were taken from Jones and Fuller (1955), Winteringer and Evers (1960), and Swink (1969). The initial tabulation was completed before the publication of distribution maps for Illinois plants by Mohlenbrock and Ladd (1978).

To determine transitional zones between floristic provinces, counties with high numbers (i.e., those with greater than 13 species reaching their range limits) were interconnected. Relatively small isolated areas having values greater than 13 were arbitrarily excluded. They may separate floristic provinces that extend into adjacent states, or counties which have been more heavily collected. For example, Champaign County (47) and Vermillion County (28) are not included in a transition zone because of the location of the University of Illinois.

RESULTS

Using the above criteria we found four floristic provinces (Fig. 1): (1) Northeast Forest, (2) Grand Prairie, (3) Prairie-Forest Transition, and (4) Southern Forest. The Northeast Forest Province terminates in portions of Winnebago, Ogle, Lee, LaSalle, Kane, Cook, Dupage, Will and Kankakee Counties. A centrally located floristic transitional zone follows the Illinois River through Sangamon, Menard, Mason, Fulton, Peoria and Tazwell Counties. This transitional zone separates the middle two thirds of the state into the Grand Prairie and Forest-Prairie Transition Provinces. A third boundary passes through thirteen southern counties and separates the Forest-Prairie Transition and Southern Forest Provinces.

Floristically, the Northeast Forest Province is largely characterized by northern forest species that become restricted southwards towards the Grand Prairie. Many species terminating their range in the northeastern zone are common boreal or northern forest species such as *Anemone quinquefolia*, *Arctostaphylos uva-ursi*, *Betula pumila*, *Carex bromoides*, *Cornus canadensis*, *Eriophorum angusti folium*, *Pinus banksiana*, *Taxus canadensis*, *Thuja occidentalis*, *Trientalis borealis*, *Ulnus rugosa*, and others. While species of boreal and northern formations are the most prevalent, other

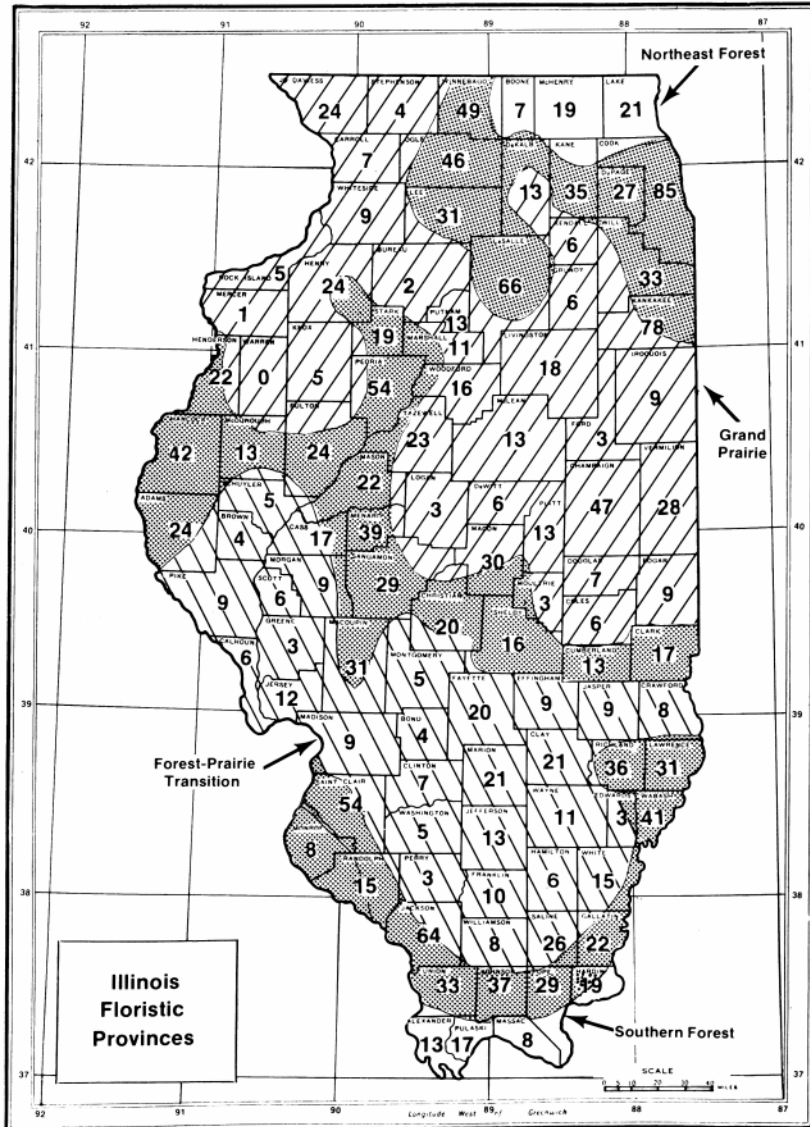


Figure 1. The distribution of floristic provinces in Illinois.

species such as beach plants and prairie smoke, *Geum triflorum*, also terminate their ranges in this zone. A total of seventy-seven species have ranges restricted to this zone. Sheviak (1974) indicates that many species of orchids with boreal affinities and eastern species exhibiting boreal ranges in Illinois are primarily restricted to this zone.

Grand Prairie and Forest-Prairie Transition Provinces have the least distinguishable boundary, especially in the eastern part of the state. Here the floristic transitional zone might be projected through several locations. The southern limit of Wisconsinan glaciation is approximated by connecting Clark, Cumberland and Shelby counties with 17, 13, and 16 species, respectively. However, the transitional zone might also be projected through Richland, Clay, Marion, Fayette, and Shelby counties. This suggests that this portion of the state has no sharp transition from one floristic province to another. This boundary generally separates an area which had extensive prairies (Grand Prairie) from a region where the prairies were extensively dissected by forests (Anderson 1970).

The central floristic transitional zone is primarily the result of southern-Ozarkian forest species being limited in their northward migration as they contact the Grand Prairie. However, the northward extension of this transitional zone along the Illinois River reflects the unique floristic composition of this region resulting from: (1) western species such as sand bluestem, (*Andropogon hallii*), sand lovegrass, (*Eragrostis trichoides*), and species that are typical sand binders (i.e. *Calamovilfa longifolia*) that occur on sand deposits along the river (Birkenholz et al. 1980; Schwegman 1975), (2) Species extending from the southern part of the state northward up the Illinois River valley (*Amsonia tabernaemontana*, *Andropogon virginicus*, *Cuphea petiolata*, *Eupatorium coelestinum*, *Festuca paradoxa*, *Heliotropium indicum*, *Monarda clinopodia*, *Muhlenbergia glabriflora*, *Scutellaria incana*, *Verbesina helianthoides*, etc.); and (3) northern species extending southward down the river valley (*Aralia nudicaulis*, *Aster linariifolius*, *Carum carvi*, *Cicuta bulbifera*, *Floerkea proserpinacoides*, *Psoralea onobrychis*, etc.).

The Southern Forest Province has a northern boundary that is quite abrupt and occurs along the southern limit of the Illinoian Glaciation. Species associated with the Mississippi embayment, the southeast, and the Appalachians are important in delineating this floristic zone. These species include *Andropogon elliotii*, *Arundinaria gigantea*, *Cocculus carolinus*, *Commelina virginica*, *Erianthus alopecuroides*, *Hymenocallis occidentalis*, *Iris fulva*, *Nyssa aquatica*, *Spigelia marilandica*, *Styrax americana*, *Taxodium distichum*, and *Vaccinium arboreum*.

DISCUSSION

There are many climatic (Page 1949) and edaphic patterns (Fehrenbacher et al. 1968) and animal geographic ranges (Smith 1961) that correspond to the floristic provinces described here. The general pattern of the provinces also correspond to the natural divisions delineated by Schwegman (1975). Southern Forest and Forest-Prairie Transition Provinces are similar to Dice's (1943) Austroriparian and Carolinian biotic provinces in Illinois, respectively. However, his Illinoian biotic province is divided into the Grand Prairie and Northeast Forest Provinces by us. The "Driftless Area" of Illinois (i.e. Jo Daviess County) should, perhaps also be distinguished as a floristic unit separate from Dice's Illinoian biotic province.

The term used by Curtis (1959) to describe transitional areas between the floristic provinces (tension zones) is, perhaps, an unfortunate term. It implies an area where conflict between plants of adjacent floristic provinces occurs. In fact, the transitional zones between the provinces represent areas where species from adjacent floristic provinces occur together and these zones may be areas of relatively high floristic diversity.

This view is supported by a map prepared by McLeary and Redfearn (1980) showing the percentage of the total moss taxa for the state known from each county. Counties occurring within transitional zones have a higher percentage of the total moss flora reported than do other counties lying outside of such zones. The high percentage of the total moss flora in the transitional counties could result from intensive collecting in these areas, or it could be due to a highly diverse moss flora occurring in these localities resulting from the intermingling of species from adjacent floristic provinces. We believe the latter explanation to be plausible.

The work presented here does not represent a definitive determination of Illinois' floristic provinces. A recent publication by Mohlenbrock and Ladd (1978) provides additional distributional records for many of Illinois' plant species. However, this study was based on distributional records contained in a copy of Winterringer and Evers (1960) annotated by Mohlenbrock in 1970. While the major floristic patterns defined here may not change greatly, distributional records of the location of floristic provinces in Illinois could undoubtedly be refined by using Mohlenbrock and Ladd (1978). This study may be of value to those who wish to pursue further the delineation of Illinois' floristic provinces, to biogeographers, and to those wishing to correlate floristic distributions with climatic patterns.

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LITERATURE CITED

- Anderson, R. C. 1970. Prairies in the prairie state. Trans. Ill. Acad. Sci. 63:214-221.
- Birkenholz, D. E., R. C. Anderson and A. J. Katz. 1980. A relict and disjunct population of *Andropogon halli* Hack. in Illinois. Castanea 45:9-16.
- Braun, E. L. 1950. Deciduous forests of eastern North America. Hafner Pub. Co., New York, pp. 596.
- Clements, F. E. 1905. Research methods in ecology. University Publishing Co., Lincoln, Nebraska, pp. 334.
- Curtis, J. T. 1959. The vegetation of Wisconsin. The Univ. of Wisconsin-Madison Press, pp. 657.
- Dice, L. R. 1943. The biotic provinces of North America, Univ. of Michigan Press, Ann Arbor, pp. 78.
- Fehrenbacher, J. B., B. W. Ray and J. D. Alexander. 1968. Illinois soils and factors in their development. In (ed.) R. E. Bergstrom, The Quarternary of Illinois, Univ. of Ill., College of Ag., Special Publ. 14, Urbana, pp. 165-175.
- Jones, G. and D. Fuller. 1955. Vascular plants of Illinois. Scientific Series Vol. VI, The Univ. of Illinois Press, Urbana and the Illinois State Museum, Springfield, pp. 593.
- McCleary, J. A. and P. L. Readfearn, Jr. 1980. Checklist of the mosses of Illinois. Trans. Ill. Acad. Sci. 72:28-55.
- Mohlenbrock, R. H. and M. Ladd. 1978. Distribution of Illinois Vascular Plants. Southern Illinois University Press, Carbondale, Ill.
- Page, J. L. 1949. Climate of Illinois, Bull 532, Univ. of Ill., Ag. Exp. Station, Urbana, pp. 364.
- Schwegman, J. 1975. The natural divisions of Illinois. In Robert H. Mohlenbrock Guide to the vascular flora of Illinois. SIU Press, Carbondale, Illinois, pp. 1-47.
- Sheviak, C. J. 1974. An introduction to the Ecology of the Illinois Orchidacea. Illinois State Museum Scientific Papers XIV, Springfield, Illinois, pp. 89 (see page 18).
- Smith, P. W. 1961. The amphibians and reptiles of Illinois. Nat. Hist. Survey Bull. 28, Article 1, Ill. Nat. Hist. Survey, Urbana, Ill., pp. 298.
- Swink, F. A. 1969. Plants of the Chicago region. Morton Arboretum, Lisle, Illinois, pp. 445.
- Vestal, A. G. 1931. A preliminary vegetation map of Illinois. Trans. Ill. Acad. Sci. 23:204-217.
- Voigt, J. W. and R. H. Mohlenbrock. 1964. Plant communities of southern Illinois. S.I.U. Press, Carbondale, pp. 202.
- Winterringer, G. S. and R. A. Evers. 1960. New records for Illinois vascular plants. Scientific Paper Services, Vol. XI, Illinois State Museum, Urbana, pp. 135.

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